REMARKS

Reconsideration and allowance in view of the foregoing amendment and the following remarks are respectfully requested.

Claims 1, 2, 4, 6, 7, 10, 11, 18-22 and 24-48 are now pending. New claims 45-48 have been added to this application to further clarify the invention. These newly added claims are supported in particular by the original specification at page 8, lines 3-5 and page 9, lines 12-13.

Claims 1, 2, 4, 6, 7, 10, 11, 18-22 and 24-38 were rejected under 35 USC 112, second paragraph, as being indefinite. Claims 1, 18 and 33 were objected to with regard to the recitation of "a gas chamber", because this chamber is allegedly only referred to in the context of the boundary layer. To advance prosecution and reduce outstanding issues, claims 1, 18, and 33 have been amended to delete the portion thereof that included the language objected to by the Examiner. It is therefore respectfully submitted that the rejection has been mooted and withdrawal of the same is requested.

Claims 1, 2, 4, 6, 7, 10, 11, 18-22, 26, 29-33, 36-39 and 42-44 were rejected under 35 USC 103(a) as being unpatentable over Mase in view of Suzuki et al. Applicant respectfully traverses this rejection.

Claims 1 and 18 have been amended above so as to recite that "each of a solid electrolytic substrate layer, an insulating substrate layer and a boundary layer is obtained by sintering original particles of a source material so as to change the original particles to sintered particles" and that "an average size of the sintered particles of the boundary layer is adjusted to be larger than an average size of the sintered particles of each of the solid electrolytic substrate layer and the insulating substrate layer". Similarly, claims 33 and 39 have been amended to recite more particularly that "each of a solid electrolytic substrate layer, another solid electrolytic substrate layer and a

boundary layer is obtained by sintering original particles of a source material so as to change the original particles to sintered particles" and that "an average size of the sintered particles of the boundary layer is adjusted to be larger than an average size of the sintered particles of each of the solid electrolytic substrate layers". The revisions to these claims are supported by the entire original disclosure including in particular page 6, lines 20-25, and page 9, lines 23-29.

Mase discloses an electrochemical device such as an oxygen sensor comprising a plurality of solid electrolyte bodies and at least one electrical insulation layer (see Abstract). More particularly, an electrical insulation layer 54 is disposed between an inner gastight ceramic layer 50 and a solid electrolyte body 28 (see column 4, lines 38-40, and column 8, lines 4-7), and an electrical insulation layer 34 is disposed between a zirconia solid electrolyte member 8 and the solid electrolyte body 28 (see Fig. 2). The insulation layer 54 is formed of the same material as that used for the insulation layers 20, 26 and 34 (see column 8, lines 10-14), and the insulation layers 20, 26 and 34 are ceramic layers comprising alumina or spinal (see column 6, lines 50-54). The solid electrolyte body 28 is made of zirconia ceramics or the like (see column 5, lines 27-28).

Suzuki discloses an oxygen concentration detector. Suzuki's detector has an oxygen concentration sensor 1, a first electrode 2, a first coating 4 and a second coating 4' in that order. Fine grains of Al_2O_3 having an average grain size of approximately 10μ are deposited on the surface of the first electrode 2 by plasma injection-welding to form the first coating 4 having a number of pores. Coarse grains of Al_2O_3 having an average grain size of approximately 40μ are deposited on the surface of the first coating 4 to form the second coating 4' having a number of coarse pores (see Fig. 2, and column 2, lines 38-47).

If the teachings concerning the second coating 4' of Suzuki are applied to the formation of the insulation layer 54 of Mase, as suggested by the Examiner, the insulation layer 54 will be formed by depositing coarse grains of Al_2O_3 having an

average grain size of approximately 40μ on the surface of the solid electrolyte body 28 having an average grain size of approximately 10μ by plasma injection-welding. Because of the plasma injection-welding, an average grain size of injected grains of Al_2O_3 in the insulation layer 54 is substantially the same as that of the coarse grains not yet injected. In this regard, it is respectfully submitted that in Mase and Suzuki, there is no teaching or suggestion of improving the breaking strength of the sensor. Consequently, neither Mase nor Suzuki consider an adjustment of grain size in the formation of layer 54.

In contrast, the inventors of the present invention have noticed that the breaking strength of the sensor can be improved when sizes of sintered particles among the boundary layer, the solid electrolytic substrate layer and the insulating substrate layer satisfy a particular relationship (see page 11, lines 6-7 of the present specification). Based on this discovery, source materials of the solid electrolytic substrate layer, the insulating substrate layer and the boundary layer are sintered to change the original particles thereof to sintered particles, and an average size of the sintered particles of the boundary layer is adjusted to be larger than that of each of the solid electrolytic substrate layer and the insulating substrate layer.

For all of the reasons advanced above, reconsideration and withdrawal of the rejection of claims 1, 18, 33 and 39 and the claims dependent directly or indirectly therefrom is respectfully requested.

Claims 24, 27, 34 and 40 were rejected under 35 USC 103(a) as being unpatentable over Mase et al in view of Suzuki et al and Sugino et al and Tatumoto et al. Applicant respectfully traverses this rejection.

These claims are submitted to be patentable over Mase and Suzuki for the reasons advanced above. The Examiners further citation to Sugino and Tatumoto does not overcome the deficiencies of the primary combination noted above. It is therefore respectfully submitted that these claims are also patentable over the prior art of record.

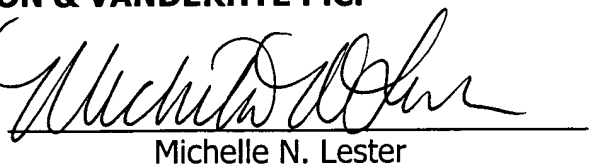
Claims 25, 18, 35 and 41 were rejected under 35 USC 103(a) as being unpatentable over Mase et al in view of Suzuki et al and Wakanabe et al or Ikezawa et al. Applicant respectfully traverses this rejection. These claims are submitted to be patentable over Mase and Suzuki for the reasons advanced above. The Examiner's further reliance on Wakanabe and Ikezawa does not overcome the deficiencies of the primary combination noted above. It is therefore respectfully submitted that these claims should be allowable as well.

Claims 37 and 43 were rejected under 35 USC 103(a) as being unpatentable over Mase et al in view of Suzuki et al and further in view of Mase '126. Applicant respectfully traverses this rejection. These claims are submitted to be patentable over Mase et al. and Suzuki for the reasons advanced above. The Examiner's further reliance on Mase '126 does not overcome the deficiencies of the primary combination noted above. It is therefore respectfully submitted that these claims should be allowable as well.

All objections and rejections having been addressed, it is respectfully submitted that the present application is in condition for allowance and an early Notice to that effect is earnestly solicited.

Respectfully submitted,

NIXON & VANDERHYE P.C.

By: 

Michelle N. Lester
Reg. No. 32,331

MNL:slj
1100 North Glebe Road, 8th Floor
Arlington, VA 22201-4714
Telephone: (703) 816-4000
Facsimile: (703) 816-4100